Michaelmas Term
[2024] UKPC 34
Privy Council Appeal No 0046 of 2022

JUDGMENT

Julian Washington (Appellant) *v* The King (Respondent) (Bermuda)

From the Court of Appeal for Bermuda

before

Lord Lloyd-Jones
Lord Leggatt
Lord Stephens
Lady Rose
Lady Simler

JUDGMENT GIVEN ON
31 October 2024

Heard on 17 June 2024

Appellant
Icah Peart KC
Amanda Clift-Matthews
Vaughan Caines
(Instructed by Simons Muirhead Burton LLP (London))

Respondent
Tom Poole KC
Carrington Mahoney, Deputy DPP
(Instructed by Charles Russell Speechlys LLP (London))

LORD LLOYD-JONES AND LORD STEPHENS:

Introduction

1. On Sunday 8 January 2012, Stefan Burgess ("the deceased") was shot dead and Davano Jahkai Brimmer was shot. Julian Marcus Washington, the appellant, was later charged with: (a) the premeditated murder of the deceased; (b) the attempted murder of Mr Brimmer; (c) using a firearm to commit an indictable offence; and (d) unlawfully handling ammunition.

2. Between 21 April and 6 May 2014, the appellant was tried before Carlisle Greaves J and a jury. At trial there was no witness who identified the appellant as the person who fired the shots. There was evidence that on 5 January 2012 a friend of the appellant, Anthony Smith, had been assaulted by the deceased, Mr Brimmer and a Mr Haywood. The prosecution relied on this evidence as providing a motive for the appellant to shoot the deceased and Mr Brimmer. However, apart from that evidence to implicate the appellant in the shootings, the prosecution's case was entirely dependent upon: (a) expert DNA evidence provided by Ms Candy Zuleger of Trinity DNA Solutions LLC, Florida, USA, to the effect that the appellant's DNA was on bullet casings found at the scene; and (b) expert gunshot residue evidence about particles identified on the appellant through samples taken the day after the shootings, which was said to support an inference that he had recently discharged a firearm. The ammunition at the scene was identified as containing lead, barium and antimony. The particles found on the appellant and his clothing comprised a large number of single-component particles of lead, barium or antimony, and three two-component particles of lead-antimony. However, the expert did not find any fused three-component particles of lead, barium and antimony, also known as gunshot residue particles or "GSR particles", on the appellant or his clothing.

3. On 6 May 2014, the appellant was convicted of all four offences. On 19 September 2014, he was sentenced to life imprisonment with an overall minimum term of 30 years' imprisonment. On 17 May 2016, the appellant's appeal against his convictions was dismissed by the Court of Appeal (Baker, President, Kay and Bell, JJA).

4. On 4 May 2022, the appellant filed an application for permission to appeal to the Board on three grounds. The first ground related to possible bias within the jury. The second and third grounds related to the gunshot residue evidence that was adduced by the prosecution at trial. In support of the second and third grounds the appellant sought permission to rely on fresh evidence including a report dated 5 March 2022 prepared by a gunshot residue expert, Angela Shaw. The appellant contended that there was no material difference between the trial judge's misdirections over the gunshot residue evidence in his case and misdirections over the same evidence identified by the Board in *Hewey v The Queen* [2022] UKPC 12.

5. On 30 September 2022, the appellant filed an application to rely on: (a) an additional ground of appeal relating to the expert DNA evidence provided by the prosecution at trial ("the additional DNA ground of appeal"); and (b) fresh evidence contained in a report dated 22 September 2022 from a DNA expert, Dr Dan Krane, in support of the additional DNA ground of appeal.

6. On 15 February 2023, the Board granted the appellant permission to appeal against his convictions on all grounds except for the ground relating to possible jury bias.

7. In preparation for the hearing of the present appeal, the respondent instructed Dr Barbara E Llewellyn to provide her opinion on the DNA results obtained by Ms Zuleger of Trinity DNA Solutions and relied on by the Crown at the appellant's trial.

8. In her report dated 18 April 2024 Dr Llewellyn agreed with Dr Krane's main conclusion, and in addition opined that the DNA samples relied on by the Crown should have been deemed inconclusive and no statistics given because Trinity DNA Solutions did not have a protocol for creating a composite DNA profile from five different electropherograms.

9. On 25 April 2024, after considering this evidence, Charles Russell Speechlys LLP ("CRS"), solicitors for the respondent, wrote to Simons Muirhead Burton LLP ("SMB"), solicitors for the appellant, stating that the respondent no longer contested the appeal. In the letter CRS stated:

> "… the Crown no longer opposes the appellant's [additional DNA] ground of appeal, namely that the DNA evidence presented at trial was flawed. … it is the Crown's position that the flaws in the DNA evidence render the appellant's conviction unsafe."

10. On 29 April 2024, CRS informed the Board that the respondent no longer contested the appeal and invited the Board to set aside the appellant's conviction and sentence. CRS also informed the Board that the Crown did not seek a retrial.

11. On 1 May 2024, SMB wrote to the Registry of the Privy Council ("the Registry") providing a draft order, which had been agreed by the parties, to be sealed by the Registrar. The draft order made no provision for the Board to give a reasoned judgment disposing of the appeal.

12. It is for the Board to determine whether to advise His Majesty that the convictions should be set aside on the basis that a miscarriage of justice has occurred. However, having considered the fresh evidence of Dr Krane and Dr Llewellyn which identified flaws in the DNA evidence relied on by the prosecution at trial and the parties' written submissions, the Board considered that it was appropriate to advise His Majesty that an order should be made: (a) granting permission for the appellant to rely on the additional DNA ground of appeal and on the evidence of Dr Krane; and (b) setting aside the appellant's conviction and sentence. The Board also considered that the appellant, who had been incarcerated for over 10 years, was entitled to his liberty in advance of His Majesty considering the advice of the Board. Accordingly, the Board, exercising its inherent power to admit an appellant before it to bail (see *Cukurova Finance International Ltd v Alfa Telecom Turkey Ltd* [2013] UKPC 25; [2016] AC 923, para 17), by order dated 3 May 2024, directed that the appellant be released on unconditional bail.

13. Even though the parties agreed, and the Board was prepared to advise His Majesty that an order should be made allowing the appeal, the appellant contended that the Board was required to hold an oral hearing and to provide written reasons for the disposal of the appeal. The respondent initially asserted that a written judgment was unnecessary in circumstances where the parties had agreed, and the Board had accepted, that His Majesty should be advised to allow the appeal. Subsequently, the respondent withdrew its objection and an oral hearing was held at which counsel for the appellant addressed the Board on the flaws in the DNA evidence presented at the trial. Counsel for the respondent did not take issue with those submissions.

14. The Board now gives its reasons for advising His Majesty that a miscarriage of justice has occurred and that the convictions should be set aside.

The factual background in relation to the shootings, the police investigation, and the appellant's defence at trial

15. The charges against the appellant and his subsequent trial and conviction arose out of the shootings which occurred on 8 January 2012.

16. On 8 January 2012, the deceased, Mr Brimmer, Mr Haywood, and others, were at Mr Haywood's house playing a video game. Between 8.30 pm and 9.00 pm, the deceased decided to leave. However, when he opened the front door between five and seven shots were fired. The deceased fell to the ground and died from his wounds. Mr Brimmer was also injured. Mr Haywood and the others ran to the bathroom to hide. Witnesses described how the person who fired the shots ("the shooter") came a short way into the house, but then left. The witnesses also stated that the shooter was dressed all in black, with a black helmet and visor, and black gloves. The witnesses could not describe the shooter's height

but stated that he was of average build. He was seen driving away on a black Scoopy 125 motorcycle.

17. Two bullet casings labelled MP-1 and MP-2 were retrieved by one officer from the vicinity of the shooting. Four others, labelled JAH 1, 2, 3 and 5, were retrieved by another officer.

18. On 9 January 2012, the appellant and Malik Outerbridge were stopped while riding Mr Outerbridge's motorcycle (which was not a black Scoopy 125). The appellant and Mr Outerbridge were arrested. The appellant's clothes were seized at the police station and a DNA sample was taken from him. The police also searched his home and seized more dark clothing.

19. Several other people were arrested in the immediate aftermath of the shooting. Other persons suspected by the police were: (a) Mr Smith who, on 5 January 2012, had been assaulted by the deceased, amongst others; (b) Mr Haywood, in whose house the shootings took place; and (c) Mr Outerbridge. DNA samples were taken from each of them.

20. The appellant was interviewed by the police and asked about the murder. He said that he did not know anything about it and had not had anything to do with it. The appellant was interviewed twice more in the presence of a legal representative, when he exercised his right to silence.

21. All those who had been arrested in connection with the shooting, including the appellant, were released. However, after the DNA analysis became available which indicated that the appellant's DNA was on bullet casings found at the scene, the appellant was re-arrested and eventually charged on all four counts.

22. At trial the defence case was that the appellant was not the person who shot the deceased or Mr Brimmer, nor had he handled the ammunition. The appellant gave evidence at trial and said that he had never shot a firearm or handled one. He had never handled ammunition.

23. The appellant said that on the evening of the shootings he was with friends at Jerome Dublin's yard ("Dublin's yard") and then stayed the night with his girlfriend, Ebony Jones, at her house. He stated that the next morning, he went to Dublin's yard where he was to be given a lift by Mr Outerbridge. He was arrested on the back of Mr Outerbridge's motorcycle. He said PC Phillips patted him down quickly but didn't go into his pockets. He was handcuffed and taken to the police station.

24. The appellant confirmed that the clothing he was wearing when he was arrested was the same clothing that he had worn the night before, except he said he left his outer jacket at Dublin's yard when he went there that morning to meet Mr Outerbridge. The appellant confirmed that he knew the deceased, Mr Brimmer and Mr Haywood, and that he had no problems or issues with any of them. He had heard about the fight between the deceased and Mr Smith because people were talking about it, and because Mr Smith had a missing tooth and he had asked him what happened. The appellant said he wasn't that close a friend of Mr Smith's, and he wouldn't have taken someone's life because of the loss of a tooth.

25. The appellant said he was certain the particles found on his hands and clothing did not come from a firearm. He said it was possible he acquired them when making fishing equipment, including melting metals for fishing weights. This was because the last time he conducted the melting process was on Friday 6 January 2012, two days before the deceased and Mr Brimmer were shot. Also, on the morning of the shooting, the appellant helped get out the fishing equipment for Mr Dublin.

26. As for the expert DNA evidence, the appellant said he had no idea why his DNA might be on the casings. He said it must have got there through touching someone or their things.

27. Ebony Jones gave evidence in support of the appellant's alibi.

The background to the DNA evidence and the additional DNA ground of appeal

(a) The nature of DNA evidence and its terminology

28. In *R v Richard Bates* [2006] EWCA Crim 1395 Moore-Bick LJ, sitting in the Court of Appeal (Criminal Division), provided the following helpful explanation of the nature of DNA evidence and its terminology as matters stood at that date.

> "*(a) The process of analysis*
>
> 11. As is well-known, DNA is a complex molecule in the form of a double helix. DNA analysis ultimately relies on the fact that different regions (or 'loci') contain repeated blocks of material known as 'alleles'. The loci are given individual designations ('D3', 'D8' etc) and the analysis is directed to 10 loci at which the alleles are known to vary widely between individuals. Although the loci at which the alleles are found are

the same in everyone, the number of blocks making up the alleles at each locus differ from person to person. An allele formed of 17 blocks would be described as ‘allele 17’. At each locus there are two alleles, one inherited from the father and one from the mother, so, for example, a person might have alleles 14 and 17 at locus D3. That is normally designated ‘D3 14, 17’. In addition to the 10 loci the analysis also includes a sex indicator, amelogenin. This is `X,X' in females and `X,Y' in males.

12. A person's DNA profile is currently built up by reference to the alleles present at the chosen 10 loci and the sex indicator. This represents an advance on previous techniques which we understand were limited to 6 loci. In due course it may be possible to refine the technique still further by including additional loci. The identification of alleles is carried out by gel electrophoresis. This process uses an electric current to draw samples of DNA through a gel and separate the alleles. Lasers are used to detect coloured markers that have been applied to the sample earlier in the process and the resulting data are fed into a computer which produces the results in graphical form. The interpretation of the graphs calls for a high degree of skill and experience and can give rise to differences of opinion, as indeed occurred at the trial in the present case. However, it is unnecessary to describe that aspect of the process in any greater detail because it was accepted that for the purposes of the appeal the summary of the results produced by the prosecution could be accepted as correct.

13. If a fresh sample of DNA from a single contributor is obtained the analysis will produce a complete profile for the person from whom it was taken. Such a profile will identify 2 alleles at each of the 10 loci together with the sex indicator. (We use the term ‘complete profile’ in the sense that it is complete in relation to the 10 loci analysed, although many other loci exist in respect of which no analysis is undertaken.) When testing material for a match with a particular suspect the first step, therefore, is to obtain a complete profile of the suspect's DNA for the purposes of comparison. A profile of DNA obtained from stains, hair or other materials found at a relevant location can then be prepared in the same way and the two compared. Data drawn from empirical research is available to enable analysts to calculate the statistical likelihood of any person within the population having a particular allele at a particular locus. Using that data it is possible to estimate the

statistical likelihood that a particular sample of DNA originated from the person whose profile is being used for comparison. This is usually referred to as the 'match probability'."

29. Moore-Bick LJ went on to describe the process of preparing a sample for analysis. He explained (at para 14) that the process can generate pieces of DNA not present in the original sample. These pieces of DNA are known as "artefacts", the most common of which appear on the graph as a low peak one unit below the true peak which denotes an allele and which are known as "stutters". Stutters are frequently observed in profiles produced by this method and account has to be taken of them when interpreting the results of the analysis. Moore-Bick LJ continued:

"*(c) Mixed profiles and partial profiles*

15. The procedure as we have described it assumes that a full profile can be obtained of the DNA recovered from the scene of the crime or other relevant location and that the sample contains the DNA of only one person. However, in practice samples often contain the DNA of more than one person, in which case the analysis will produce what is known as a 'mixed profile'. A mixed profile can be identified by the presence of more than two alleles at any single locus. In such cases it is necessary to identify the number of contributors to the profile and to establish separate profiles for each of them. This gives rise to certain difficulties in the interpretation of the results of the analysis to which we shall return. Moreover, even in a case where there is only one contributor to the sample, it may not be possible to obtain a complete profile, that is, to identify two alleles at each of the 10 loci. A profile in which, for whatever reason, some alleles cannot be identified is referred to as a 'partial profile'.

16. In a mixed sample originating from two or more persons it is often the case that one person (the 'major contributor') will have contributed much more of the DNA present than the others (the 'minor contributors'). That results in higher peaks appearing on the graph at the locations of the major contributor's alleles and lower peaks appearing at the locations

> of alleles obtained from the minor contributors. Where the major contributor and a minor contributor have the same allele at the same location the peak produced by the minor contributor's allele will be hidden by that produced by the major contributor's allele. This phenomenon is known as 'masking' and may account for the apparent absence of an allele belonging to the minor contributor. The presence of a stutter in the profile of the major contributor may also mask an allele in the profile of the minor contributor.
>
> 17. If only a partial profile can be obtained from the sample under test there will be some loci at which only one allele, or perhaps no alleles at all, have been found. That may be due to a variety of causes which include masking, the loss of some molecules from the sample and the tendency of molecules with a high molecular weight to degrade. In very rare cases there may be no allele at that locus. Such 'voids' are potentially significant because, if the missing allele did not match either of the alleles at that locus of the person under investigation, it would establish conclusively that he (or she) had not provided that sample of DNA. Every partial profile carries within it, therefore, the possibility that the missing information excludes the person under investigation, but there is currently no means of calculating the statistical chances of that being the case."

30. As Moore-Bick LJ foresaw, the technique has been refined by including more loci. The Board has been greatly assisted by a paper published by the Royal Society and the Royal Society of Edinburgh in 2017 entitled "Forensic DNA Analysis, A Primer for Courts", which provides the following explanation.

> "*2.1 DNA analysis in forensic science – short tandem repeats*
>
> Only small sections of an individual's DNA are analysed routinely for forensic evidence. The parts analysed are called short tandem repeats (STRs). Mutations that affect the number of repeats are relatively common so within a population there are usually several different versions of the DNA at an STR locus with different repeat lengths. The different versions are called alleles….

> The frequency of occurrence of a specific allele (ie a specific number of repeating units) at the tested locus in a specific population provides a measure of how common that allele is in that population. This information is essential for calculating match probabilities. If only one STR were analysed, there would be many people with the same allele, purely by chance. It is therefore necessary to analyse a number of different STR loci to ensure that the chance of two unrelated people having matching DNA profiles is very small. Over time, the number of different STR loci analysed has increased as technology has developed. Since 2014 in the UK, 16 loci are examined. In some Scottish cases, 23 loci are examined."

(b) The DNA evidence presented at trial

31. The Board is grateful to Ms Clift-Matthews for her clear and helpful explanation and submissions at the hearing before the Board concerning the DNA evidence at trial in 2014. At trial the Crown relied on expert evidence given by Ms Zuleger of Trinity DNA Solutions. Ms Zuleger's reports prior to trial are dated 24 January 2012, 14 February 2012, 31 May 2012, 18 March 2013 and 12 August 2013. At trial she stated that the appellant had been excluded as a possible contributor to the DNA on two of the six casings (MP-1 and MP-2) found near the scene of the shooting. With regard to the mixed sample obtained from the other four casings (JAH1, JAH2, JAH3 and JAH5) Ms Zuleger's evidence was that a partial profile for the sample was obtained and that it contained a mixture of DNA from at least three individuals. She said that the appellant could not be excluded as a possible contributor to that DNA, whereas other individuals involved or said to be involved in the shootings were specifically excluded as contributors. Ms Zuleger's evidence was that the frequency of occurrence from an unrelated individual was one in 46 million in the black population of Bermuda and one in 173 million in the white population of Bermuda. The appellant is black and the total population of Bermuda is approximately 60,000. Accordingly, although Ms Zuleger put the DNA evidence in relation to the shell casings below the highest category of a full profile, which would provide a match, her evidence was relied upon by the Crown as supporting an inference that the appellant handled the ammunition used in the shootings and was therefore the shooter.

32. At the trial the appellant had not retained, and so therefore did not call, an expert in relation to the DNA evidence. Accordingly, Ms Zuleger's evidence that the appellant was a possible contributor to the partial DNA profile taken from the casings was not challenged at trial.

(c) The additional DNA ground of appeal and the DNA evidence obtained since the trial

33. As explained at para 5 above, in support of the additional DNA ground of appeal, the appellant applied to adduce a report dated 22 September 2022 by Dr Dan Krane, Professor of Biological Sciences at Wright State University, Dayton, Ohio, USA. In his report Dr Krane was highly critical of some significant features of the way in which the DNA evidence was collected, examined, interpreted and presented to the jury that are not apparent in Ms Zuleger's evidence. He considered that, due in part to failures to adhere to good practice and in part to more recent improvements in DNA analysis and statistical techniques, the evidence presented by Ms Zuleger at trial was flawed and inflated the likelihood that the appellant contributed to the DNA on the casings.

34. Ms Zuleger responded to Dr Krane's report in two statements dated 15 April 2023 and 3 September 2023. In the first she disputed Dr Krane's assertion that combining multiple amplifications was not a generally accepted practice. She stated that "Trinity DNA Solutions considered it the most conservative to include all the data in the calculation to account for more possible combinations of donor DNAs." She acknowledged that the tools in place at the time of the trial were not ideal for the types of data they were obtaining. However, she said that at no point in this analysis would the appellant be excluded from this profile.

35. As explained in para 7 above, the respondent instructed Dr Llewellyn to provide her opinion on the DNA testing and analysis relied on at trial. In her report dated 18 April 2024, Dr Llewellyn concluded that the sample of mixed DNA taken from the four casings (JAH1-3 and 5) should have been considered inconclusive and that no statistics should have been given on the basis of that sample because Trinity DNA Solutions did not have a protocol for creating a composite DNA profile from five different electropherograms. (Indeed, having been taken through Ms Zuleger's summary table of results, the Board thinks it likely that Ms Zuleger based her analysis on a composite DNA profile of all six electropherograms taken of the sample from the four casings.) Furthermore, Dr Llewellyn agreed with Dr Krane's conclusion that there were significant errors in the way in which statistical weights were attached to the failure to exclude persons of interest to evidence samples at trial. Jurors were given an unreliable statistical weight of "one in 46 million", and the statistic was inappropriately represented as being equivalent to a chance of innocence. Dr Llewellyn also concluded (at para 14) that Trinity DNA Solutions did not have the proper policies and procedures in place to allow for the combining and interpretation of the DNA profiles derived from the mixed sample taken from JAH 1-3, 5.

36. As explained at paras 9-11 above, in light of this evidence, the respondent: (a) accepted that the DNA evidence presented at trial was flawed; (b) invited the Board to quash the conviction and sentence; and (c) did not seek a retrial.

Criticisms of the DNA evidence which was presented at trial

The evidence of Dr Krane

37. Dr Krane states in his report dated 22 September 2022 that Trinity DNA Solutions performed autosomal testing in 2012 and 2013 on swabs taken from casings JAH 1-3, 5 and reference samples from the appellant and other persons of interest. The autosomal DNA tests of the evidence were carried out using both the Applied Biosystems Identifiler Plus and MiniFiler PCR Amplification test kits. The former is designed to obtain information from a total of 15 different loci. The latter is designed to obtain information from a subset of only eight of the loci used in the former. In their report dated 14 February 2012, Trinity DNA Solutions concluded that with respect to the casings swabs sample JAH 1-3, 5 the autosomal DNA test results revealed "a DNA mixture consistent with originating from at least three individuals at thirteen (13) loci". The profiles of the major and minor donors could not be determined. Trinity DNA Solutions also performed a CPI calculation (combined probability of inclusion) and concluded that the profile for the appellant's sample was included as a possible contributor to the mixture. The combined frequency of occurrence of the mixed DNA profile for unrelated individuals was approximately one in 46 million for the Bermuda Black Population and one in 173 million for the Bermuda White Population. Four other persons of interest were excluded as possible contributors to this mixture.

38. The key criticisms made by Dr Krane of the evidence relied on by the prosecution at the trial of the appellant and the resulting submissions on behalf of the appellant are addressed in the following paragraphs.

39. First, the sample of DNA obtained from the four casings (JAH 1-3, 5) was taken from the four casings together. As a result, the profile obtained may have come partly from one casing and partly from another or from any combination of the four, so as to create a profile that was not present on any of them.

40. On behalf of the appellant, it is submitted that taking a composite sample assumes that the same person or persons handled all of the items from which the composite sample was taken. If this is not the case an artificial profile is constructed. As a result, composite samples from different items are not permissible. Thus, the Scientific Working Group on DNA Analysis Methods ("SWGDAM") Interpretation Guidelines for Autosomal STR Typing by Forensic DNA Testing Laboratories (2010) states (para 3.4.3.1):

> "Unless there is a reasonable expectation of sample(s) originating from a common source (eg duplicate vaginal swabs or a bone), allelic data from separate extractions from different

> locations on a given evidentiary item should not be combined into a composite profile."

On behalf of the appellant the point is made that Ms Zuleger assumed that the same person or persons would have touched each casing. However, it was established by her earlier analysis of the two other casings (MP-1 and 2) that the same persons did not handle all of the ammunition, because different results were obtained, and the appellant was excluded from being a contributor to the DNA on those casings. The jury was not informed of this assumption or its significance.

41. Secondly, Ms Zuleger carried out multiple amplifications (six test runs) which all produced different sets of results. Nevertheless, she aggregated all the results which were inconsistent with each other. (We note that in her witness statement dated 15 April 2023 Ms Zuleger explained that "[t]he majority of data has been taken from the [second Identifiler] run. Minifiler results, again, are used to fill in the profile and the kit is used in conjunction with the Identifiler Plus profile.") As a result, there was a risk that she included purported alleles that were, in fact, stutters ("drop in"). She included in her table of alleles all the peaks that she had designated in each of the test runs, even if a peak appeared in only one test run. It was on the basis of this aggregation that Ms Zuleger concluded that the appellant was a possible contributor to the sample. Dr Krane explains (at para 9 of his report) that combining information from more than one amplification of an evidence sample, especially when there are inconsistencies in the test results that could be argued to be exculpatory, was not at the time these analyses were carried out, and still is not, a generally accepted practice.

42. The appellants make the further point that the risk of drop in is greater with low template DNA. Thus the UK Forensic Science Regulator Guidance, Cognitive Bias Effects Relevant to Forensic Science Examinations FSR-G-217 (Issue 2, 2020) on DNA evidence states (at para 7.4.7):

> "Replication should be applied whenever a poor quality profile is to be relied on to progress an investigation or provide evidence against a suspect. It assists in evaluating reproducibility, identifying spurious peaks and informing conclusions relating to the likelihood of allelic drop-out and the number of contributors. Replication allows a fuller understanding of the nature of the sample and reduces the scope for conjecture and the risk of misinterpretation..."

The failure of Ms Zuleger to consider whether the results could be reproduced is not explained in her working notes, her report or her evidence.

43. Thirdly, Dr Krane considers that the conclusion that the appellant may have been a contributor to the sample must have relied upon assumptions and, potentially, "suspect-centric" circular reasoning. Here, Dr Krane makes two distinct criticisms.

> (a) Where the results at a locus corresponded with the appellant's genotype, Ms Zuleger assumed that there was a complete set of alleles for this locus. However, where the results at a locus did not correspond to the appellant's genotype, she assumed that there was not a complete set of alleles. The jury was not made aware of these assumptions.
>
> (b) Dr Krane makes the further point that it appears that Ms Zuleger may have used the appellant's genotype to interpret the results of the sample from the four casings. He explains (at para 19 of his report) that to use a suspect's genotype to interpret an unknown profile would be circular and unscientific because it would rely upon what it seeks to prove. He states that a suspect-centric approach is also apparent from the analysis Ms Zuleger performed on samples on other items not relied upon at trial. She produced different common probability of inclusion ("CPI") statistics for the same sample according to different reference profiles of various suspects, whereas a CPI statistic is specific to the sample, not the reference profile. He states (at para 21 of his report):
>
> "Test results at loci should either be interpretable or not interpretable and that determination should be made in the absence of any information about persons of interest in an investigation. The reporting of more than one statistical weight for a single evidence sample is a clear sign that a testing laboratory has applied an inappropriate, suspect-centric approach to its generation of a combined probability of inclusion/exclusion statistic."

44. Fourthly, it is submitted on behalf of the appellant that Ms Zuleger's evidence was imbalanced and weighted in favour of the prosecution. Here counsel for the appellant point to the fact that some of the results provided grounds for positively excluding the appellant as a contributor to the DNA mixture. Dr Krane refers (at para 14) to the fact that two loci where only one allele was detected were excluded from Ms Zuleger's CPI calculation. (In the second Identifiler analysis of the sample for both the D19S433 and the vWA loci, a 14 and a 15 allele, respectively, were detected. The appellant has a 14 and a 14.2 allele at the D19S433 locus and has a 15 and a 16 allele at the vWA locus.) Dr Krane states that the appellant would therefore be excluded as a possible contributor to the sample unless his alleles were presumed to have "dropped out" (ie to be below threshold) at those loci. Ms Zuleger must have assumed that the appellant's alleles dropped out at these loci. However, Dr Krane states that excluding the appellant as a

contributor would have been another valid interpretation and consistent with Ms Zuleger's assumption that she had a full complement of alleles at the other 11 loci with no drop outs.

45. Fifthly, Dr Krane explains that a CPI calculation for indistinguishable mixtures depends upon two preconditions.

> (a) There must be no possibility of allelic drop out at a locus (ie peaks not being detected). This is to ensure that the resultant set of combined alleles forming part of the statistical analysis includes all genotypes that could contribute to the mixture.
>
> (b) The number of contributors must be known in order properly to assess the risk of allelic drop out at each locus.

In the present case, neither of these pre-conditions for performing a CPI calculation was satisfied. This was an indistinguishable low template DNA sample with an unknown number of contributors. Ms Zuleger knew that the profile did not have a complete set of alleles because no results were obtained at all at two loci. Indeed, she relied on there having been allelic drop out at two other loci. Furthermore, Ms Zuleger aggregated all the alleles that appeared in each of her six test runs, even where the alleles were not replicated in the different test runs. In order to aggregate all alleles, she must have relied upon allelic drop out to explain why these alleles were missing from the other test runs (see Krane paras 16, 18). As a result, the CPI calculation provided an unreliable and inflated indication of probability. Dr Krane concludes (at para 24) that:

> "The possibility of allelic drop out at many or all of the loci used to calculate the CPI significantly underestimates the chances of a random individual failing to be excluded as a contributor to that sample."

As a result, Dr Krane considers that the suggestion that there was a one in 46 million chance that someone other than the appellant is the source of DNA in the mixed sample was not correct.

46. Sixthly, Dr Krane explains (at para 10) that the CPI statistic that Trinity DNA Solutions used as part of its analysis of the mixed sample was widely used to attach statistical weights to mixed DNA test results in 2012. However, he drew attention to a report of the US President's Council of Advisors on Science and Technology ("PCAST") dated 20 September 2016 which highlighted the difficulties inherent in the interpretation of complex mixed DNA samples. The PCAST report observed (section 5.1, p 76):

> "It is often impossible to tell with certainty which alleles are present in the mixture or how many separate individuals contributed to the mixture, let alone accurately to infer the DNA profile of each individual."

Dr Krane explains that such concerns have resulted in the CPI statistic now being considered an unreliable means of attaching a statistical weight to mixed DNA profiles with an unknown number of contributors where allelic drop out may have occurred. As a result, most forensic DNA profiling laboratories have now turned to probabilistic genotyping approaches to attach statistical weights to samples with an unknown number of contributors, in particular where allelic drop out may have occurred, as in the sample in the present case. Dr Krane considers this a major improvement.

47. Seventhly, not only was the suggestion that there was a one in 46 million chance that someone other than the appellant was a source of DNA in the mixed sample incorrect, but in the presentation of the DNA evidence at the trial this incorrect characterisation was exacerbated by what is known as the prosecutor's fallacy. This consists in wrongly equating the probability that an unrelated person with the appellant's genotype would be included in the mixture, with the probability that the appellant left the crime scene sample. (See *R v Doheny* [1997] 1 Cr App R 369, per Phillips LJ at pp 372G-374A.)

48. Eighthly, Dr Krane expresses his overall conclusions as follows (at para 27):

> "In conclusion, there were significant errors in [the] way in which statistical weights were attached to the failure to exclude persons of interest to evidence samples in Julian Washington's 2014 trial. Some of those errors should have been known at the time the testing was performed and others have come to be more broadly understood in the years since the analyses were performed. It would have been most appropriate to have characterized the testing of the casings sample in Mr Washington's case as 'inconclusive'. Instead, jurors were given an unreliable statistical weight of 'one in 46 million' and where the statistic was inappropriately represented as being equivalent to a chance of innocence in a clear example of what has been known since 1987 as 'the prosecutor's fallacy'."

The evidence of Dr Llewellyn

49. The evidence of Dr Barbara E Llewellyn commissioned by the respondent supports the conclusions of Dr Krane in a number of important respects. In particular:

> (1) The mixed sample was amplified twice with the Identifiler Plus Amplification System Kit. The first time, partial results were only obtained at 2 of the 15 potential autosomal loci. The second time, a partial DNA profile was obtained at 12 of the 15 autosomal loci. This profile exhibited potential alleles below the laboratory's interpretation threshold and therefore should have been considered inconclusive. It should not have been used for comparison to any DNA standards. In her statement in response to Dr Krane's evidence, Ms Zuleger had disputed Dr Krane's assertion that combining multiple amplifications was not a generally accepted practice. She stated that "Trinity DNA Solutions considered it the most conservative to include all the data in the calculation to account for more possible combinations of donor DNAs."
>
> (2) The mixed sample was then tested four times with the MiniFiler Amplification Systems kit which can be used to obtain results from degraded and low level DNA samples. The results still demonstrated potential alleles below threshold.
>
> (3) Trinity DNA Solutions did not have a policy regarding the criteria for interpreting the redundant loci obtained with the MiniFiler Amplification System kit. This was a departure from the SWGDAM Interpretation Guidelines for Autosomal STR Typing by Forensic DNA Testing Laboratories para 1.4.
>
> (4) Ms Zuleger combined the DNA typing results obtained from the Identifiler Plus Amplification System kit and all four of the MiniFiler Amplification System kit electropherograms into one composite DNA profile that was used to include the appellant. (para 8)

50. However, Dr Llewellyn goes further in one important respect. She concludes that Trinity DNA Solutions did not have in place the appropriate policies and procedures to permit the analysis and interpretation of the multiple amplifications of the mixed sample of DNA taken from the casings JAH 1-3, 5. As a result, she considers that the sample should have been deemed inconclusive and no statistics should have been given on the basis of this sample. "In conclusion, Trinity DNA Solutions did not have the proper policies and procedures in place to allow for the combining and interpretation of the DNA profiles from Identifiler and Minifiler electropherograms for sample JAH 1-3, 5.

According to the 2010 SWGDAM Interpretation Guidelines for Autosomal STR Typing by Forensic DNA Testing Laboratories:

> "'3.4.3.1. If composite profiles (ie generated by combining typing results obtained from multiple amplifications and/or injections) are used, **the laboratory should establish guidelines for the generation of the composite result'**. (Dr Llewellyn's emphasis).
>
> The laboratory did not demonstrate that they had the validation studies or procedure guidelines to support their ability to create a composite DNA profile for sample JAH 1-3, 5 using 5 different electropherograms from 5 different analysis. [sic] Therefore, the use of this composite DNA profile does not meet the 2010 SWGDAM Interpretation Guidelines for Autosomal STR Typing by Forensic DNA Testing Laboratories and should not be used for inclusion."

Conclusions on the DNA evidence which had been presented at trial and the Board's conclusion in relation to the additional DNA ground of appeal

51. On behalf of the respondent, Mr Tom Poole KC accepted the criticisms made by Dr Krane and Dr Llewellyn of the DNA evidence at trial as summarised above.

52. In these circumstances the Board considers that it is in the interests of justice to admit the fresh evidence contained in the reports of Dr Krane and Dr Llewellyn.

53. For the reasons identified in those reports, the Board further considers that the convictions of the appellant are unsafe and should be quashed.

54. In these circumstances, it is not necessary to address the appellant's other grounds of appeal.

Duties owed by expert witnesses in Bermuda

55. The Board considers it appropriate to reiterate the duties of an expert witness as: (a) the flaws in the DNA evidence were not disclosed by Ms Zuleger to those conducting the trial; (b) basic assumptions were omitted from Ms Zuleger's report; and (c) factors which clearly undermined her opinion were omitted from Ms Zuleger's report and

evidence. However, before doing so it is appropriate to set out the impact of the flawed expert DNA evidence which was given at this trial.

56. Ms Zuleger gave evidence that a partial profile was derived from the sample obtained from the four casings and that the appellant *could not be excluded as a possible contributor* to the sample. She then gave a statistic as to the likelihood of a member of the Bermudian black population *failing to be excluded as a possible contributor* as being one in 46 million. In other words, out of 46 million members of the Bermudian black population, all except one would have been excluded by the test results as being possible contributors to the DNA. The likelihood of that one person contributing the DNA instead of the appellant was correspondingly remote. She explained that the reason for giving the statistic was so that the jury knew "what sort of weight to assign" to the possibility the appellant was a contributor to the sample. The judge in summing up Ms Zuleger's evidence told the jury that:

> "… she is saying the possibility that this profile, in which she said [the appellant] was included, was related to someone other than [the appellant] was one in those millions. The odds that it belonged to somebody else, then, other than [the appellant] was one in 46 million when you consider the Bermuda Black Population …."

Given the statistic of one in 46 million, Ms Zuleger's evidence effectively compelled the jury to the conclusion that the appellant's DNA was on the four casings. It was powerful evidence which led to the wrongful conviction and incarceration of the appellant. At trial Ms Zuleger did not seek to qualify or draw any potential flaws in her evidence to the attention of the jury or the trial judge. It is now accepted by the Crown that Ms Zuleger's evidence was flawed and that the apparently compelling evidence given by her ought not to have been given. Thus, there is a need to reiterate the duties on expert witnesses and also to emphasise the obligations resting on both those instructing experts and on trial judges.

57. The duties on an expert witness in Bermuda were set out by the Board in *Myers v The Queen* [2015] UKPC 40, [2016] AC 314 ("*Myers*"). In *Myers*, at para 59, Lord Hughes stated that the duties of an expert to the court were helpfully set out by Cresswell J in the commercial case of *The Ikarian Reefer* [1993] 2 Lloyd's Rep 68 at 81 but apply equally in the criminal context: *R v Harris* [2005] EWCA Crim 1980, [2006] 1 Cr App R 5, paras 271-272. Lord Hughes then stated that the duties which were summarised in *R v Harris* included the following:

> "(1) Expert evidence presented to the court should be and seen to be the independent product of the expert uninfluenced as to form or content by the exigencies of litigation.
>
> (2) An expert witness should provide independent assistance to the court by way of objective unbiased opinion in relation to matters within his expertise. An expert witness in the High Court should never assume the role of advocate.
>
> (3) An expert witness should state the facts or assumptions on which his opinion is based. He should not omit to consider material facts which detract from his concluded opinions.
>
> (4) An expert should make it clear when a particular question or issue falls outside his expertise.
>
> (5) If an expert's opinion is not properly researched because he considers that insufficient data is available then this must be stated with an indication that the opinion is no more than a provisional one.
>
> (6) If after exchange of reports, an expert witness changes his view on material matters, such change of view should be communicated to the other side without delay and when appropriate to the court."

58. Ms Zuleger's reports prior to trial did not contain any declaration that she understood her duty to the court to give independent evidence, whichever side it may favour. There was no statement that if there was any material which weighed against any proposition which she was advancing then it was her duty to bring that evidence to the attention of the court. An explanation as to why her report did not contain an expert's declaration may be that the duties of an expert witness in the USA where she mainly practises differ from the duties on an expert witness in Bermuda. If that is so, then it is even more important for those who instruct experts who ordinarily practise in the USA to bring these exacting standards to the expert's attention. The Board was informed that prior to trial the Director of Public Prosecutions ("the DPP") had informed Ms Zuleger of her duties as an expert witness though this communication was not, as it should have been, recorded in writing. The Board was also informed that as a matter of recent practice the DPP now requires experts to provide a suitable declaration in their reports.

59. Finally, in relation to expert evidence, the Board also notes that, in order to provide a fair trial, it is incumbent upon the trial judge to be satisfied that these exacting standards are recognised and discharged by expert witnesses. Ordinarily, the trial judge will be so satisfied if the expert's report contains a suitable declaration.

The DPP's review of cases in which the Crown relied on DNA analysis carried out by Trinity DNA Solutions

60. In the interests of confidence in the administration of justice, the Board sets out information provided by the DPP as to the nature of the review being conducted in relation to other cases in which the Crown relied on DNA analysis carried out by Trinity DNA Solutions. The need for the review is obvious given that (a) all DNA analysis for the Bermuda Police Force between 2009 and 2015 was undertaken by Trinity DNA Solutions; and (b) the flaws which occurred in the appellant's case may have occurred in other cases.

61. Prior to the hearing on 17 June 2024 the Board was informed by the DPP that:

> (a) The review commenced on 24 April 2024 shortly after the DPP received Dr Llewelyn's report dated 18 April 2024 and is being conducted by Detective Sergeant Jewel Hayward, Forensic Support Unit Supervisor in the Bermuda Police Service.
>
> (b) The review covers all the flaws identified by Dr Krane and Dr Llewellyn and is not confined to cases in which the ldentifiler Plus Amplification System kit and the MiniFiler Amplification System was used.
>
> (c) The first stage of the review has established that between 2006 and 2015 Trinity DNA Solutions carried out forensic analysis in 426 cases for the Crown. Of these 426 cases, DNA was found in 247.
>
> (d) Having identified those 247 cases, the second stage of the review will be to identify whether any cases resulted in a prosecution and conviction.
>
> (e) If so, then the third stage of review involves sending all relevant documentation, including the trial transcript, to Dr Llewellyn who will assess whether any of the flaws identified by Dr Krane and Dr Llewellyn in the appellant's case are present.

(f) If any such flaws are identified, then Dr Llewellyn will report to the DPP, and the individual concerned will be notified of those flaws.

62. At the hearing on 17 June 2024 Mr Poole provided further information as to the nature of the review as follows:

(a) The DPP will not await the identification of flaws before informing a convicted person of the existence of a review into DNA evidence. Rather, as soon as it becomes apparent that any individual in the 247 cases has been convicted then that individual will immediately be informed that a review is being conducted by Dr Llewellyn.

(b) Once informed the individual can make their own submissions to Dr Llewellyn and instruct their own expert.

(c) Dr Llewellyn's report will be disclosed to the individual as well as being provided to the DPP.

(d) It is anticipated that the review will be concluded by the end of July 2024.

(e) Any case in which the individual is in prison will be prioritised.

(f) The review by Dr Llewellyn also extends to those cases in which (a) there was a prosecution, but the accused was acquitted; and (b) where there was no prosecution.

63. In response Mr Peart KC accepted that the review now suggested by the DPP was appropriate but suggested, on a purely pragmatic basis given the amount of work to be undertaken by Dr Llewellyn, that Dr Krane should also be instructed. However, the nature and extent of the review and by whom it is to be conducted is a matter for the DPP. The Board cannot direct the DPP to carry out the review in a particular way or by a particular person. The DPP has provided information in relation to the review in a transparent manner to maintain public confidence in the administration of justice. The Board records the information which has been provided by the DPP for the same purpose of maintaining public confidence that a review is being carried out to correct potential miscarriages of justice.

Overall conclusion

64. For these reasons the Board will advise His Majesty that the appellant's applications to advance the additional DNA ground of appeal and to adduce expert evidence from Dr Krane should be allowed, that the appeal should be allowed, and the convictions and sentence quashed.